

CLAIMS

1. A method for producing an aluminum-alloy shaped product, comprising:

a step of forging a continuously cast rod of aluminum alloy serving as a forging material, in which the aluminum alloy contains Si in an amount of 10.5 to 13.5 mass%, Fe in an amount of 0.15 to 0.65 mass%, Cu in an amount of 2.5 to 5.5 mass% and Mg in an amount of 0.3 to 1.5 mass%, and

heat treatment and heating steps including a step of subjecting the forging material to pre-heat treatment, a step of heating the forging material during a course of forging of the forging material and a step of subjecting a shaped product to post-heat treatment, said pre-heat treatment including treatment of maintaining the forging material at a temperature of -10 to 480°C for two to six hours.

2. The method according to claim 1, wherein the pre-heat treatment is performed at a temperature of at least 200°C and 370°C or lower.

3. The method according to claim 1, wherein the pre-heat treatment is performed at a temperature of at least -10°C and less than 200°C.

4. The method according to claim 1, wherein the pre-heat treatment is performed at a temperature of at least 370°C and 480°C or lower.

5. The method according to any one of claims 1 to 4, wherein the post-heat treatment is performed at 170 to 230°C for one to 10 hours without performing solid solution treatment.

6. The method according to any one of claims 1 to 5, wherein, the aluminum alloy further contains Ni in an amount of 0.8 to 3 mass%.

7. The method according to any one of claims 1 to 6, wherein the aluminum alloy further contains P in an amount of 0.003 to 0.02 mass%.

8. The method according to any one of claims 1 to 7, wherein the aluminum alloy further contains at least one species selected from among Sr in an amount of 0.003 to 0.03 mass%, Sb in an amount of 0.1 to 0.35 mass%, Na in an amount of 0.0005 to 0.015 mass% and Ca in an amount of 0.001 to 0.02 mass%.

9. The method according to any one of claims 1 to 8, wherein the aluminum alloy contains the Mg in an amount of 0.5 to 1.3 mass%.

10. The method according to any one of claims 1 to 9, wherein the aluminum alloy further contains at least one species selected from among Mn in an amount of 0.1 to 1.0 mass%, Cr in an amount of 0.05 to 0.5 mass%, Zr in an amount of 0.04 to 0.3 mass%, V in an amount of 0.01 to 0.15 mass% and Ti in an amount of 0.01 to 0.2 mass%.

11. The method according to any one of claims 1 to 10, wherein during the forging step, a percent reduction of a portion of the forging material that requires high-temperature fatigue strength resistance is regulated to 90% or less.

12. The method according to any one of claims 1 to 11, wherein in the forging step, the heat treatment step is performed at a temperature of 380 to 480°C.

13. The method according to any one of claims 1 to 12, wherein the continuously cast rod is produced through continuous casting of a molten aluminum alloy having an average temperature which falls within a range of a liquidus temperature + 40°C to the liquidus temperature + 230°C at a casting speed of 80 to 2,000 mm/minute.

14. An aluminum-alloy shaped product produced through the method according to any one of claims 11 to 13 and having a metallographic structure in which

crystallization product networks, acicular crystallization products or crystallization product aggregates that have been formed during a course of continuous casting remain partially even after forging and heat treatment steps.

15. An aluminum-alloy shaped product produced through the method according to any one of claims 1 to 13 and having a eutectic Si area share of 8% or more, an average eutectic Si particle diameter of 5  $\mu\text{m}$  or less, 25% or more of eutectic Si having an acicular eutectic Si ratio of 1.4 or more, an intermetallic compound area share of 1.2% or more, an average intermetallic compound particle diameter of 1.5  $\mu\text{m}$  or more and 30% or more of intermetallic compounds or intermetallic compound aggregates having an intermetallic compound length or intermetallic compound aggregate length of 3  $\mu\text{m}$  or more.

16. A production system comprising a continuous line for performing a series of steps for producing an aluminum-alloy shaped product from a molten aluminum alloy, wherein the series of steps includes at least the steps of any one of the first to thirteenth mentioned methods.